

Washington State Department of Ecology

Environmental Assessment Program

Standard Operating Procedure for Field Collection, Processing and Preservation of Finfish Samples at the Time of Collection in the Field

Version 1.0

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EAP009

Please note that the Washington State Department of Ecology's Standard Operating Procedures (SOPs) are adapted from published methods, or developed by in-house technical and administrative experts. Their primary purpose is for internal Ecology use, although sampling and administrative SOPs may have a wider utility. Our SOPs do not supplant official published methods. Distribution of these SOPs does not constitute an endorsement of a particular procedure or method.

Any reference to specific equipment, manufacturer, or supplies is for descriptive purposes only and does not constitute an endorsement of a particular product or service by the author or by the Department of Ecology.

Although Ecology follows the SOP in most instances, there may be instances in which Ecology uses an alternative methodology, procedure, or process.

SOP Revision History

[illegible]

Environmental Assessment Program

Standard Operating Procedure for Field Processing and Preservation of Fish Samples.

1.0 Purpose and Scope

- 1.1 This document is the Environmental Assessment Program (EAP) Toxics Study Unit (TSU) Standard Operating Procedure (SOP) for field collection, processing and preservation of finfish samples at the time of collection in the field, in preparation for resection and compositing in the lab at a later date.
- 1.2 Washington State Department of Ecology investigates the occurrence and concentrations of toxic contaminants in fish tissue. This SOP is intended to provide consistent techniques that ensure the quality of sample collection, tissue preparation (including whole finfish or other body parts) for the purpose of homogenizing samples for chemical analysis by an accredited analytical laboratory. This SOP was adapted from the Environmental Protection Agency's (EPA) *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1 Fish Sampling and Analysis Third Edition* (2000).

2.0 Applicability

This procedure is to be followed by Ecology person(s) conducting any project involving finfish tissue sample collection and processing at the time of collection in the field.

3.0 Definitions

- 3.1 Processing Bench Sheet - a table, usually created in Excel®, used to plan and document sample processing data for each fish collected (Attachment 1).
- 3.2 Composite – composite samples are homogeneous mixtures of samples from two or more individual organisms of the same species collected at a particular site and analyzed as a single sample.
- 3.3 Ecology – Washington State Department of Ecology.
- 3.4 EAP – Environmental Assessment Program.
- 3.5 Field Logbook – A weather resistant logbook used to document any and all field activities, sample data, methods and observations for each and all collection sites.
- 3.6 Lab Analysis & Tracking Plan – a table, usually created in Excel®, used to plan and document lab analyses of samples for single or multiple projects (Attachment 2).
- 3.7 QAPP – Quality Assurance Project Plan.

- 3.8 Resecting – surgical removal of all or part of an organ, tissue or structure.
- 3.9 TSU – Washington State Department of Ecology’s Toxics Study Unit.
- 3.10 WDFW – Washington Department of Fish and Wildlife.
- 3.11 WSTMP – Washington State Toxics Monitoring Program.

4.0 Personnel Qualifications/Responsibilities

Boat operations require that staff meet specific training requirements as described in EAP’s Field Safety Manual, such as an EA Boating Course and an approved Boating Safety Course. Most field operations also require training specified in EAP’s Field Safety Manual such as First Aid, CPR, and Defensive Driving. Staff leading or participating in electrofishing operations must meet qualifications described in Scientific Collection Permits (required qualification may vary by permits, so each permit needs to be consulted).

5.0 Equipment, Reagents, and Supplies

- 5.1 Fish identification guides.

Wydoski, R. and R. Whitney. 2003. *Inland Fishes of Washington*, Second Edition. University of Washington Press. Seattle, WA.

Sport Fishing Rules for Washington – current year’s edition located at <https://fortress.wa.gov/dfw/erules/efishrules/index.jsp>.

- 5.2 Field weather resistant notebook - Rite in the Rain™ (Figure 1).
- 5.3 Indelible ink and pens that function when wet.
- 5.4 Marking pens, pencils, pencil sharpener, permanent markers.
- 5.5 Field Identification (ID) tags (Figure 2).
- 5.6 Identifying tape - blue painter’s masking tape.
- 5.7 Camera.
- 5.8 Bench scale – battery operable; include extra batteries (Figure 3).
- 5.9 Heavy-duty aluminum foil (Reynolds Foodservice Foil 45.7cm x 152.4mm (624) and 38.1cm x 152.4mm (622)).

- 5.10 Talc-free nitrile exam gloves.
- 5.11 Paper towels.
- 5.12 Garbage bags.
- 5.13 Polyethylene zip seal bags – gallons sizes.
- 5.14 Large (11 in X 14 in) polyethylene bags for preserving large fish
- 5.15 Plastic cable ties (zip ties).
- 5.16 Headlamp with extra batteries and an extra new bulb available.
- 5.17 Flashlights with extra batteries.
- 5.18 Gloves for handling fish.
- 5.19 Coolers with ice – enough coolers and ice for ice to surround expected fish collected.
- 5.20 5 gallon bucket.
- 5.21 Deionized distilled (DI) water.
- 5.22 Copy of QAPP which specifies the fish to be collected.
- 5.23 Scientific Collection Permits and associated equipment/references required by permits.
- 5.24 Electrofishing log forms (for boat and/or backpack electrofishers).
- 5.25 Fish collection gear such as boat, electrofishers, nets, fishing poles and tackle, and related equipment.



Figure 1. Field weather resistant notebook - Rite in the Rain.™

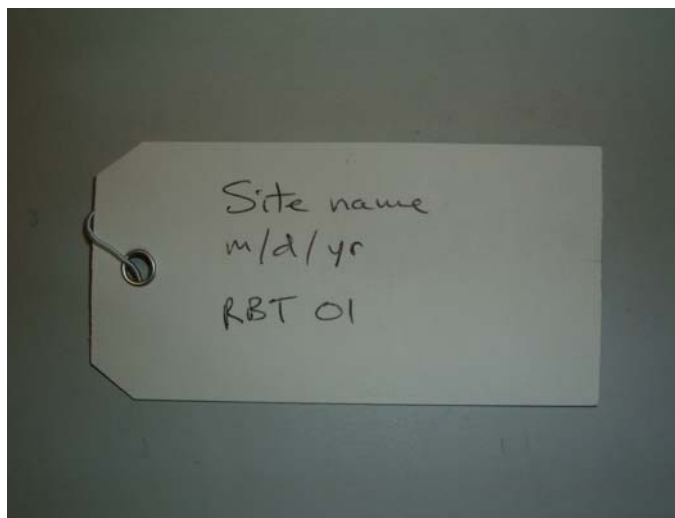


Figure 2. Fish field identification tag.



Figure 3. Bench scale.

6.0 Procedure

6.1 Fish collection planning.

6.1.1 Plan field sampling. Successful fish collection efforts require planning at various levels. The QAPP will describe project goals and help guide the selection of fish to collect from designated sites. Various Scientific Collection Permits are required at all sites and may dictate numerous conditions related to fish collection efforts. Reconnaissance of fish collection locations provides information needed to plan field efforts. Selection of fish collection methods and gear help determine what resources are needed in the field to collect target numbers and species of fish. Finally, field efforts must be documented in order to meet requirements of various permits and to record information about samples collected for the project.

6.1.2 Review QAPP. Identify the specifics needed to meet project objectives. Items of primary concern are: timing and locations of fish collections, numbers and size ranges of target species at each site, collection methods, field processing procedures, and any information relevant to the collection and preservation of samples.

6.1.3

Review collection permits. Determine the need for permits and/or permissions to collect fish at each site and contact the unit permit coordinator to obtain copies of relevant permits. Permits may need to be applied for, and is a process that can take from 2 to 6 months. One or more permits from various agencies and/or documented permission from other entities are needed to collect fish from, or gain access to, any site. Table 1 summarizes the various permits and agencies that may have jurisdiction at fish collection sites. Each permit has unique requirements about: species, locations, time of collection, collection methods and restrictions, personnel authorized for field work, record-keeping and reporting, notification of permitting authority, and more. Permits generally require that the permitting authority be contacted prior to collection within a time frame specified in permits (usually about 4 weeks to 3 days).

Table 1. Summary of Permits or Permissions Needed for Collecting Fish.					
Who Issues	Example	Permit Type	Geographic Coverage	Species	Application Information
WDFW	Washington State Department of Fish and Wildlife	Formal Permit	All waters within state	All species	http://wdfw.wa.gov/scp/
NOAA - NMFS	Atmospheric Administration - National Marine Fisheries Service	Formal Permit	Most of state where about 14 ESA-listed anadromous salmonids species occur	Salmon & Steelhead	http://www.nmfs.noaa.gov/pr/permits/esa_permits.htm
USFWS	U.S Fish and Wildlife Service	Formal Permit	Much of state where the ESA-listed Bull Trout has been found	Bull Trout	http://www.fws.gov/Endangered/permits/index.html
National Parks	Olympic NP, Lake Roosevelt National Recreation Area	Formal Permit	Within National Park, Nat'l Recreation Area boundaries	All species	http://www.nps.gov/deva/Requirement.htm
Other State Agencies	Washington Parks and Recreation	Formal Permit	In waters or access points managed by WA Parks and Recreation	All species	http://www.parks.wa.gov/permitmenu.asp
Tribes	about 30 recognized Tribes in Washington	documented permission or notification	In waters or access points where Tribes have jurisdiction	All species?	http://www.chs.hca.wa.gov/doc/tribaldirectory.pdf
Other Federal Agencies	USFS, BLM, BOR, USACE,	documented permission or notification	In waters or access points where such agencies have jurisdiction	All species?	individual agencies
Local Government	Cities, towns, counties	documented permission or notification	In waters or access points managed by local gov't	All species?	individual governments
Private Landowners	private citizens, utility companies operating dams	documented permission or notification	In waters or access points managed by local gov't	All species?	individual private landowners

Table 1. Various permits and agencies that may have jurisdiction at fish collection sites.

6.1.4

Site Reconnaissance. Obtain information about the site, access, species, local conditions, and any information that will improve chances of a successful fish collection effort. WDFW and other agency biologists have been very helpful with local knowledge. A site reconnaissance checklist (Attachment 3) can help guide inquiries into site characteristics. Most reconnaissance can be done via phone, email, and office resources (e.g. Gazetteer, GIS, and other staff).

6.1.5

Select fish collection methods. Determine which collection gear and methods are appropriate for site characteristics and meeting project objectives. Boat electrofishing and gill netting are the most common methods used by Ecology's Toxics Study Unit (TSU). Other methods include backpack electrofishing, angling, and use of other nets

such as beach seines, fyke nets, and otter trawls. Ensure needed equipment is available and in serviceable condition prior to field collection efforts. An inventory of nets and accessory gear (Attachment 4) is located at Y:\SHARED Files\WSTMP. Note that special training is required for boat operations and electrofishing.

- 6.2 Collect fish and document field efforts.
 - 6.2.1 Prepare gear and travel to site with crew needed to collect fish.
 - 6.2.2 At the site, brief crew on site specific objectives and operations such as: boating plan; collection methods and gear; site characteristics; target species, numbers, and size ranges; and record-keeping. Ensure all needed gear is loaded into boat if boat is used.
 - 6.2.3 Prepare field logs for recording pertinent data from fishing effort. Set up the Boat Electrofishing Log form for the site (Figure 4) for any boat operations. This form is designed for use with the electrofishing boat, yet can be used for other boat operations as well. Other boats may have a log book for similar operations.

Boat Electrofishing Log Date(s): 9/1/05
 Site: Snokomish R. opp. Snokomish
 Crew: K. Seiders, C. Deligmann
 Weather & conditions: clear, warm, sunny
 W. wind 5-10 mph

Date	Time uw	M.E. hrs	Time rn	M.E. hrs
9/1/05	1440	743.3	1830	746.4

Surface WQ

Location	Time	Temp (C)	Cond (µS/cm)	Vis (ft)
near Fiddler's Bluff	1510	18.8	70	6+

Electronics Log

Time	Gen hrs	Seconds	PPS	Vrange	V%	Amps
1515	322.2	0	30	H	100	1.5
1530	—	200	60	H	100	2.0
1800	323.6	1784	60	H	100	2.0

Silver Lk - Cowlick Co.

FISH RETAINED

ID#	TL	WT	DATE
B91	176	115	9-27-05
2	158	82	
3	177	111	
4	158	80	
5	161	95	
6	167	100	
7	162	89	
8	160	90	
9	166	104	
10	155	86	
11	148	65	

FISH ENCOUNTERED

LMB — 40
 GCP — 20
 CCP — 20
 LGS — 3
 CRAPPE — 4
 BGI — 20
 YP — 1
 FISH < 5% 50

Figure 4. Front and back (right to left) of Electrofishing Log form.

If boat electrofishing, all fields are required to be filled out (NOAA permit requirement). If not boat electrofishing, all fields except Surface WQ and the Electronics Log need to be filled out. Enter time of day and engine hours when getting

underway and when returning to launch point. Measure and record the surface temperature and conductivity at a point representative of where electrofishing will occur. Fill out generator hours and electronics settings at start and end of electrofishing effort. Any changes in electrofishing settings during fishing are recorded in the Electronics Log section.

The back of the form is used to record the approximate number of individuals for each fish species encountered (WDFW permit requirement). Additional pages can be used for notes required by permits or additional information such as sample collection activities, hydrologic conditions, weather conditions, boat or equipment operations, any other unusual activities observed (i.e. dredging), or problems encountered that would be useful to the manager in evaluating the quality of the fish contaminant monitoring data.

If backpack electrofishing, the same type of information in the boat electrofishing log is required. An electronics log for backpack electrofishing is included as an example in Attachment 5.

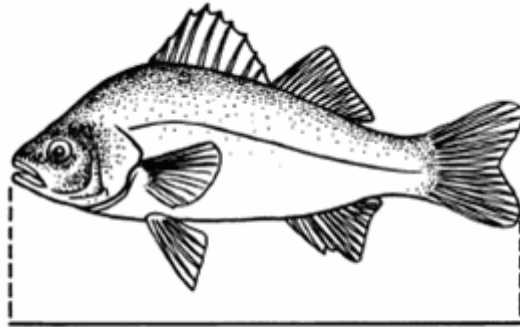
If setting gill or fyke nets, or beach seine with block net, for each net ID, record the location of each net set on a map/chart or GPS coordinates and the times of net set and retrieval. Also record the numbers and species of fish collected with each net set. These notes are made in the field log book and/or on accompanying maps or charts of the site.

If trawling, record the net ID used, times and locations of trawl deployment and retrieval, and the numbers and species collected in the field logbook or accompanying maps or charts of the site.

If angling, record the location and time of effort along with numbers and species of fish encountered and collected in the field logbook or accompanying maps or charts of the site.

- 6.2.4 Collect fish and identify fish to species level as soon as collected. Ensure that adequate numbers and size ranges described in the QAPP are met. See Attachment 6 for target fish species. Nontarget species or specimens that do not meet size requirements should be returned to their home environment. Experienced personnel knowledgeable in local fish identification and taxonomic keys, appropriate to the waters being sampled, should be consulted for species identification. **Correct identification of species in the field is critical to project needs.**
- 6.2.5 Inspect fish to ensure that the specimen has no broken skin, damaged fins or other injuries that may compromise the quality of the sample. Damaged specimens should be discarded. Rinse selected fish in ambient water to remove any foreign material from the external surface.
- 6.2.6 At the end of the fish collection effort, return to the launch point, ensure that the field logs are correctly filled out, and begin preparations to process the fish retained for the study.

- 6.3 Prepare to field-process fish.
 - 6.3.1 Prepare Field Logbook for the following:
 - 6.3.1.1 Project Name
 - 6.3.1.2 Sampling date and time
 - 6.3.1.3 Sampling site location
 - 6.3.1.4 Collection method
 - 6.3.1.5 Collector's names
 - 6.3.1.6 Species collected and number of individuals of each species
 - 6.3.1.7 Field ID number for each fish specimen retained
 - 6.3.1.8 Total length (measured to nearest millimeter)
 - 6.3.1.9 Weight (measured to nearest gram)
 - 6.3.1.10 Notes including visible morphological abnormalities such as fin erosion, skin ulcers, cataracts, skeletal and exoskeletal anomalies, neoplasms, or parasites.
 - 6.3.2 Prepare field identification tags for each specimen on a waterproof tag using indelible ink and writing implements that can function when wet (Figure 2). Record the site name, date collected, species or species abbreviation, and a unique field ID for the individual fish at that site, (e.g. RBT 01 through RBT 05 for five rainbow trout collected).
 - 6.3.3 Prepare blue painter's tape to serve as specimen identification once the fish has been double-wrapped in foil. Write the abbreviated species and field ID on the tape with a sharpie marking pen. Tear off enough of the labeled tape to wrap around the foil-wrapped fish.
 - 6.3.4 Label polyethylene bag(s) with a sharpie marker pen to hold the collected fish. Write the collection location, collection date, species of fish and unique field IDs of the fish placed in the bag.
- 6.4 Sample Processing and Preservation.
 - 6.4.1 Stun large fish by a sharp blow to the base of the skull with a wooden or metal club to facilitate processing and packaging. Keep the club reasonably clean to prevent contamination of the samples. Small fish may be asphyxiated or stunned by putting on ice immediately after capture (U.S. EPA 2000).
 - 6.4.2 Measure the total length to the nearest millimeter of each fish. Total length (also called maximum body length) is defined as the length from the anterior-most part of the fish to the tip of the longest caudal fin ray (when the lobes of the caudal fin are compressed dorsoventrally) (Figure 5) (U.S. EPA 2000 referencing Anderson and Gutreuter, 1983). Record total length in the Field Log Book.



Maximum body length

Figure 5. Recommended measurements of body length and size for fish. Maximum body length is defined as the length from the anterior-most part of the fish to the tip of the longest caudal fin ray (when the lobes of the caudal fin are compressed dorsoventrally) (U.S. EPA 2000 referencing Anderson and Gutreuter, 1983).

- 6.4.3 Weigh each fish to the nearest gram using a portable, battery operated bench scale. Record weight in the Field Log Book.
- 6.4.4 Wrap individual fish in two layers of extra heavy duty aluminum foil (dull side in). Wrap completely in the first layer of foil then repeat with the second layer. Place labeled field identification tag between the two layers of foil. Secure wrapped fish with the labeled identifying tape by wrapping the tape around the middle of the wrapped fish (Figure 6).

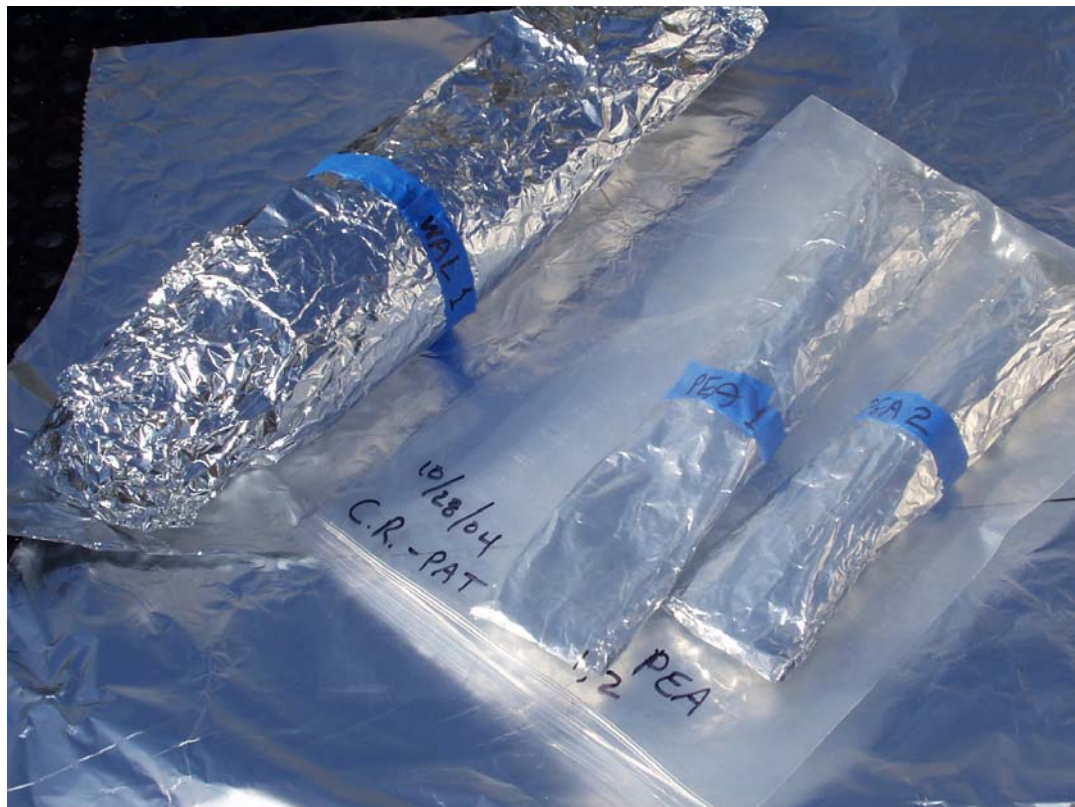


Figure 6. Fish wrapped in two layers of foil (dull side to fish), taped with label and placed with same species into labeled water-tight polyethylene bags.

- 6.4.5 Place fish of the same species into labeled water-tight polyethylene bag(s) and seal by zipping bag or by using zip ties. Place packaged fish in ice immediately.
- 6.4.6 Transport specimens to the processing lab as quickly as possible and place in a freezer at $\leq -20^{\circ}\text{C}$ for later processing.

7.0 Records Management

- 7.1 Field Log Book – The Field Log Book is kept with a designated project team member for safe-keeping and retrieval as needed.
- 7.2 Boat Electrofishing Log – pre-preprinted log forms on Write in the Rain™ paper can be obtained from TSU staff Casey Deligeannis or Patti Sandvik.
- 7.3 The Lab Analysis & Tracking Plan and Processing Bench Sheet are tables, usually created in Excel®, used to document and coordinate all activities and data for single or multiple projects per collection and sampling time period and for documenting the tissue sample preparation for lab analysis. See *Fish Tissue Processing SOP* Section 7.0 for more information and about these two forms.

8.0 Quality Control and Quality Assurance Section

- 8.1 Assure sample integrity is preserved by preventing the loss of contaminants already present in the tissues and by preventing extraneous tissue contamination (U.S. EPA 2000). Loss of contaminants present in fish can be prevented by ensuring that the skin on fish has not been lacerated by the sampling gear or other mechanisms. Identify possible sources of extraneous tissue contamination such as sampling gear, grease from boat winches or cables, spilled engine fuel, engine exhaust, dust, ice chests and ice and take appropriate steps to minimize or eliminate them (U.S. EPA 2000).
- 8.2 Verify that all information is filled out on the field identification cards for each fish sample and that cards matches the same information written in the Field Log Book per fish length and weight.
- 8.3 Verify that the Field Log Book contains all documentation of field activities, sample data, methods and observations for each and all collection sites.
- 8.4 Verify the accuracy of the information in all hard copy and electronic documentation such as on the bench sheet and the lab tracking plan. Write the abbreviation *QA*, *date*, and *initial* each hard copy bench sheet, lab tracking plan and Field Log Book that you verify.

- 8.5 Drain ice chest often to prevent possible cross contamination from melting ice during transport.

9.0 Safety

- 9.1 Fish processing should be conducted only by or under the supervision of someone with experience.
- 9.2 Gloves are required for fish processing to avoid exposure to pathogens and chemicals, and to avoid sample contamination. Hands should be cleaned using soap and clean water after completing work or any time hands become soiled during the process. Gloves should be replaced whenever they get torn, punctured, or anytime used gloves are removed from hands.
- 9.3 Follow general procedures for safety found in the *Environmental Assessment Program Safety Manual* Chapter 1 (2006). Extra care should be given for night collections and field processing. Ensure adequate lighting. Use of a night head lamp is recommended. Have extra batteries and a new bulb available.

10.0 References

- 10.1 U.S. EPA (Environmental Protection Agency). 2000. *Guidance for assessing chemical contaminant data for use in fish advisories, Volume 1 fish sampling and analysis*. 3rd ed. <http://www.epa.gov/ost/fishadvice/volume1>. Accessed March 2006.
- 10.2 Ecology. 2006. *Environmental Assessment Program Safety Manual*. Environmental Assessment Program. <http://www.ecology/programs/eap/Safety/New%20Safety%20Plan%2004-05-06.pdf>. Accessed May 2006.
- 10.3 Zaroban, D.N., M.P. Mulvey, T.R. Maret, R.M. Hughes and G.D. Merritt. 1999. *Classification of Species Attributes for Pacific Northwest Fishes*. Northwest Science, Vol. 73, No. 2, pp. 81-93. May 1999.

Attachment 1. Processing Bench Sheet, (example only)

Note: The bench sheet used during lab processing may look different due to different fields and requirements of the processes involved, but fields will be available for documentation and cross reference of each sample's information.

2005 WSTMP Fish Field and Bench Processing Data							Sort #1: Waterbody, Species, TL decending or ascending							Sort #2: Waterbody, Species, ECY Field ID							Processing crew:	
Waterbody	ECY Field ID	Spec	WDFW Field ID	WDFW DNA ID (CD05 -)	DNA taken ?	Total Length (mm)	Weight (gm)	FCI	Collect Date	Collect Method	Process date	fillet weight (gm)	L, R, or B fillet	skin status	sex	fish age	scale card #	scale #	otolith tray #	otolith cell #	Orig notes: opercle, spine	Comment
Loon Lake	1	LMB	-	652	Y	441	1542	1.80	10/26/05	ecy-E	1/14/06	290	R	ON	F	8	124	1	14	18	NA	Do as indiv for Hg Trend, All caught in NW end of lake (boat launch area). Hg-20g ARCHIVE-20g for Hg TREND jars.
Loon Lake	2	LMB	-	646	Y	425	1289	1.68	10/26/05	ecy-E	1/23/06	242	R	ON	M	7	123	2	14	13	NA	Do as indiv for Hg Trend, Also do as part of 5-fish comp for WSTMP. All caught in NW end of lake, boat launch area. Hg-20g ARCHIVE-20g for Hg TREND jars.
Loon Lake	3	LMB	-	647	Y	450	1725	1.89	10/26/05	ecy-E	1/23/06	286	R	ON	F	11	123	3	14	12	NA	Do as indiv for Hg Trend, Also do as part of 5-fish comp for WSTMP. All caught in NW end of lake, boat launch area. Hg-20g ARCHIVE-20g for Hg TREND jars.
Loon Lake	4	LMB	-	651	Y	453	2011	2.16	10/26/05	ecy-E	1/24/06	320	R	ON	F	10	124	4	14	19	NA	Do as indiv for Hg Trend, All caught in NW end of lake, boat launch area. Hg-20g ARCHIVE-20g for Hg TREND jars.
Loon Lake	5	LMB	-	648	Y	473	1917	1.81	10/26/05	ecy-E	1/23/06	321	R	ON	F	11	123	5	14	14	NA	Do as indiv for Hg Trend, Also do as part of 5-fish comp for WSTMP. All caught in NW end of lake, boat launch area. Hg-20g ARCHIVE-20g for Hg TREND jars.
Loon Lake	6	LMB	-	649	Y	438	1525	1.81	10/26/05	ecy-E	1/23/06	212	R	ON	M	10	123	6	14	16	NA	Do as indiv for Hg Trend, Also do as part of 5-fish comp for WSTMP. All caught in NW end of lake, boat launch area. Hg-20g ARCHIVE-20g for Hg TREND jars.
Loon Lake	7	LMB	-	650	Y	490	2381	2.02	10/26/05	ecy-E	1/23/06	394	R	ON	F	12	123	7	14	15	NA	Do as indiv for Hg Trend, Also do as part of 5-fish comp for WSTMP. All caught in NW end of lake, boat launch area. Hg-20g ARCHIVE-20g for Hg TREND jars.
Loon Lake	8	LMB	-	653	Y	485	2015	1.77	10/26/05	ecy-E	1/24/06	375	R	ON	F	11	124	8	14	20	NA	Do as indiv for Hg Trend, All caught in NW end of lake, boat launch area. Hg-20g ARCHIVE-20g for Hg TREND jars.
Loon Lake	9	LMB	-	654	Y	432	1569	1.95	10/26/05	ecy-E	1/24/06	262	R	ON	F	10	124	9	14	21	NA	Do as indiv for Hg Trend, All caught in NW end of lake, boat launch area. Hg-20g ARCHIVE-20g for Hg TREND jars.
Loon Lake	10	LMB	-	655	Y	425	1537	2.00	10/26/05	ecy-E	1/24/06	276	R	ON	F	8	124	10	14	17	NA	Do as indiv for Hg Trend, All caught in NW end of lake, boat launch area. Hg-20g ARCHIVE-20g for Hg TREND jars.

Attachment 2. Lab Analysis and Tracking Plan, (example only)

Note: The lab tracking plan may look different, due to different fields and requirements of the project(s) involved, but fields will be available for documentation and cross reference of each sample's collection and processing information.

2005 Fish Sample Tracking and Lab Plan: Final Copy. Sort on "Site-Species"																jar size ->	4 oz	4 oz	2 oz	4 oz				
																weight of sample (gm)								
WSTMP	PBDE	Fillet+Carc Lab Dup	MSMSD	Site	specie	collect date	# fish avail	#fish in comp	PBDE lipids	Pest PCB PBDE lipid	PCB cong ener	Hg	Field ID	MEL week #	MEL Lab ID	process date	Pest PCB PBDE lipid	PCB Cong ener	Hg	Archive	aliquot per fish (g)	skin: off or on	Comment	Samples to Lab date
x	x			Bead L	BUR	10/26/05	5	5	-	1	-	1	BEADBUR	51	4700	11/17/05	90	90	90	90	100	OFF		12/21/05
x	x			Bead L	KOK	10/26/05	5	5	-	1	-	1	BEADKOK	51	4701	12/15/05	45	-	45	45	30	on	SPAWNING NO SCALES	12/21/05
	x			Bead L	LSS	10/26/05	5	5	1	-	-	-	BEADLSS	51	2000	11/15/05	90*	-	-	90*	50	on		12/21/05
x	x			Bead L	NPM	10/26/05	9	5	-	1	1	1	BEADNPM	51	4702	11/18/05	90	90	50	90	100	on		12/21/05
x	x			Bead L	PEA	10/26/05	5	5	-	1	-	1	BEADPEA	51	4703	11/18/05	40	-	18	40	20	on		12/21/05
	x			Chelan L	CTT	10/6/05	5	5	1	-	-	-	CHELCTT	51	2001	11/17/05	90*	-	-	90*	45	on		12/21/05
	x			Chelan L	KOK	10/5/05	6	5	1	-	-	-	CHELKOK	51	2002	11/17/05	90*	-	-	90*	50	on	Couldnt pull scales / scales slipped	12/21/05
				Chelan L	RBT	10/6/05	5	5	-	-	-	-	CHELRBT	HOLD	HOLD	11/16/05	90*	-	-	90*	40	on	3 RBT & 2 CTT / see BS. DO not analyze due to mixed species.	
	x			Columbia R @ Kettle Falls	LSS	10/20/05	5	5	1	-	-	-	CRKETLSS	51	2003	10/25/05	90*	-	-	90*	130	on	* PBDE lipids only	12/21/05
	x			Columbia R @ Kettle Falls	LWF	9/13/05 10/20/05	6	5	1	-	-	-	CRKETLWF	52	2027	12/23/05	90*	-	-	90*	75	on	2 collection dates: 9/13/05, 10/20/05	12/29/05
	x			Columbia R @ Kettle Falls	RBT	10/20/05	4	4	1	-	-	-	CRKETRBT	51	2004	11/16/05	90*	-	-	90*	50	on	4 RBT & 1 BT / see BS	12/21/05
	x			Columbia R @ Kettle Falls	WAL	10/20/05	5	5	1	-	-	-	CRKETWAL	51	2005	11/16/05	90*	-	-	90*	50	on		12/21/05
	x			Columbia R nr Cathlamet	LSS	8/30/05	5	5	1	-	-	-	CRCATLSS	51	2006	11/14/05	90*	-	-	90*	75	on		12/21/05
x	x	F		Columbia R nr Cathlamet	NPM	8/30/05	5	5	-	1	1	1	CRCATNPMF	02	4738	1/4/06	90	90	45	90	100	on	5-fish composite of fillet	01/12/06
x	x	C		Columbia R nr Cathlamet	NPM	8/30/05	5	5	-	1	-	-	CRCATNPMC	02	4739	1/4/06	90	-	-	90	336	on	5-fish composite of carcass	01/12/06
x	x			Columbia R nr Cathlamet	PEA	8/30/05	5	5	-	1	-	1	CRCATPEA	52	4720	12/20/05	90	-	50	90	52	on		12/29/05
	x			Columbia R nr McNary Dam	CC	11/15/05	5	5	1	-	-	-	CRMCNARCC	51	2015	12/15/05	90	-	-	90	44	OFF		12/21/05
	x			Columbia R nr McNary Dam	LSS	11/15/05	5	5	1	-	-	-	CRMCNARLS	51	2016	12/16/05	90*	-	-	90*	90	on	* PBDE lipids only	12/21/05
	x			Columbia R nr McNary Dam	YP	11/15/05	5	5	1	-	-	-	CRMCNARYP	51	2014	12/16/05	75*	-	-	75*	32	on	* PBDE lipids only	12/21/05
x				Cowlitz River	CTT	8/29/05	5	5	-	1	1	1	COWCTT	51	4704	9/20/05	100	100	50	100	100	on	Field IDs 1,2,3,5,7	12/21/05
x				Cowlitz River	MWF	8/29/05	6	5	-	1	-	1	COWMWF	51	4706	10/20/05	90	80	40	75	75	on		12/21/05
x				Cowlitz River	NPM	8/29/05	6	5	-	1	1	1	COWNPM	51	4707	10/20/05	80	80	40	90	87	on		12/21/05

Attachment 3. Site Reconnaissance Checklist

WSTMP Fish Sampling Site Recon Checklist (Oct 2005)

Site Physical Info

- _____ Gazetteer Page and Coord
- _____ obtain map of site (e.g. WA Lakes book, web sites, USGS quad, NOAA chart, bathymetry useful)
- _____ info on temperature, water levels (high flow/low flow issues?)
- _____

Contacts

- _____ NOAA, USFWS, WDFW, other as required by Permits
- _____ DFW biologist
- _____ USFWS biologist
- _____ Tribal biologist
- _____ Ecology Regional staff, EAPer
- _____ Others (e.g. local lodge, guide service, etc.)
- _____ Lake Association or Volunteer Monitors?
- _____ Sheriff
- _____ DFW Enforcement
- _____ Tribal Enforcement
- _____ other gov't agency (e.g. USFS, city, county)
- _____

Fish Info

- _____ check DFW regulations
- _____ check WashingtonLakes.com site for site info, species, angler reports
- _____ check Gazetteer for species info
- _____ review hatchery plant record: species, size, numbers, release dates (DFW database or DFW web site)
- _____ note sources of info
- _____ species present
- _____ size ranges of targets
- _____ when where how fish/capture - local knowledge
- _____ boat & launch access - public? Private? DFW boatlaunch key needed?
- _____ conditions - weather, wind, current, hazards
- _____ shoreside residents, night electrofishing bothersome?
- _____ any local persons to contact about our ops?
- _____ any DFW survey work done or planned
- _____ any concerns about fishery, land use, pollutant sources, etc.
- _____ DFW web site for fishing reports, updates to regs, etc.
- _____

ESA Listed species:

- _____ timing of run for each listed species (start, peak, end)
- _____ spawning habitat?
- _____ strategies to avoid harassing listed species
- _____ water temperatures
- _____

Historical data (water, sed, tissue)

- _____ study, date, publication info
- _____ brief summary of what done and findings
- _____ fish info
- _____

Invasive or Nuisance species presence

- _____ ever surveyed? When?
- _____ Plants? Animals? (e.g. NZ mudsnail)
- _____ nuisance species present
- _____

Attachment 4. Net and Accessory Gear Inventory

TSU Gill Net Inventory 8/9/2005 - final draft																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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Attachment 5. Backpack Electrofishing Log (example only)

ELECTROFISHER LOG

SMITH-ROOT 12-A POW

SN 103234 Mon/Day/Yr ____/____/____

ANODE # _____ Stream Name _____

CATHODE # _____ Stream ID _____

Crew Members (initials) _____

WATER TEMPERATURE _____ degrees C

SPECIFIC CONDUCTIVITY _____ uS/cm at 25 degrees C

AMBIENT CONDUCTIVITY _____ uS/cm at T _____

This can be estimated by: Specific conductivity/[1.02^(25-T)].

DOMINANT SUBSTRATE (check one) Hard/rocky [☐] Soft/fines/organics [☐]

ESTIMATED AVG. WETTED WIDTH _____ m

ESTIMATED AVG. THALWEG DEPTH _____ cm

RIGHT MODE (check one): 7 [☐]; 8 [☐]; 9 [☐]; 10 [☐]; 11 [☐]. This refers to cycle time (2,4,6,8 or 10 sec).

TRIAL	LEFT MODE	VOLTAGE	Time started	Comments	Sampling setting
					(check one)
	F (30 Hz)	100	_____ hrs	_____	[<input type="checkbox"/>]
	F (30 Hz)	200	_____ hrs	_____	[<input type="checkbox"/>]
	F (30 Hz)	300	_____ hrs	_____	[<input type="checkbox"/>]
	F (30 Hz)	400	_____ hrs	_____	[<input type="checkbox"/>]
	F (30 Hz)	500	_____ hrs	_____	[<input type="checkbox"/>]
	F (30 Hz)	600	_____ hrs	_____	[<input type="checkbox"/>]
	F (30 Hz)	700	_____ hrs	_____	[<input type="checkbox"/>]
	F (30 Hz)	800	_____ hrs	_____	[<input type="checkbox"/>]
	F (30 Hz)	900	_____ hrs	_____	[<input type="checkbox"/>]
	F (30 Hz)	1000	_____ hrs	_____	[<input type="checkbox"/>]
	I (45 Hz)	100	_____ hrs	_____	[<input type="checkbox"/>]
	I (45 Hz)	200	_____ hrs	_____	[<input type="checkbox"/>]
	I (45 Hz)	300	_____ hrs	_____	[<input type="checkbox"/>]
	I (45 Hz)	400	_____ hrs	_____	[<input type="checkbox"/>]
	I (45 Hz)	500	_____ hrs	_____	[<input type="checkbox"/>]
	I (45 Hz)	600	_____ hrs	_____	[<input type="checkbox"/>]
	I (45 Hz)	700	_____ hrs	_____	[<input type="checkbox"/>]
	I (45 Hz)	800	_____ hrs	_____	[<input type="checkbox"/>]
	I (45 Hz)	900	_____ hrs	_____	[<input type="checkbox"/>]
	I (45 Hz)	1000	_____ hrs	_____	[<input type="checkbox"/>]
	L (60 Hz)	100	_____ hrs	_____	[<input type="checkbox"/>]
	L (60 Hz)	200	_____ hrs	_____	[<input type="checkbox"/>]
	L (60 Hz)	300	_____ hrs	_____	[<input type="checkbox"/>]
	L (60 Hz)	400	_____ hrs	_____	[<input type="checkbox"/>]
	L (60 Hz)	500	_____ hrs	_____	[<input type="checkbox"/>]
	L (60 Hz)	600	_____ hrs	_____	[<input type="checkbox"/>]
	L (60 Hz)	700	_____ hrs	_____	[<input type="checkbox"/>]
	L (60 Hz)	800	_____ hrs	_____	[<input type="checkbox"/>]
	L (60 Hz)	900	_____ hrs	_____	[<input type="checkbox"/>]
	L (60 Hz)	1000	_____ hrs	_____	[<input type="checkbox"/>]

GENERAL COMMENTS:

Note: All settings listed here are at pulse widths 4 to 0.2 ms (wide to narrow varying).

Attachment 6. Target Fish Species

Target fish species for Washington State Toxics Monitoring Program: sorted by order of preference using feeding behavior, comparative value to historical data, likelihood of encounter, angler use (2005). Adapted from Northwest Science (1999).

blank	Common name	Scientific name	Habitat	Feeding	Water temp	Tolerance*	order of preference	Family name
	Largemouth bass	<i>Micropterus salmoides</i>	water col.	piscivore	warm	T	1	Centrarchidae
	Smallmouth bass	<i>Micropterus dolomieu</i>	water col.	piscivore	cool	I	2	Centrarchidae
	Walleye	<i>Stizostedion vitreum</i>	water col.	piscivore	cool	I	3	Percidae
	Rainbow trout	<i>Oncorhynchus mykiss</i>	hider	invert/piscivore	cold	S	4	Salmonidae
	Brown trout	<i>Salmo trutta</i>	hider	invert/piscivore	cold	I	5	Salmonidae
	Cutthroat trout	<i>Oncorhynchus clarki</i>	water col.	invert/piscivore	cold	S	6	Salmonidae
	Kokanee salmon	<i>Oncorhynchus nerka</i>	water col.	invertivore	cold	S	7	Salmonidae
	Yellow perch	<i>Perca flavescens</i>	water col.	invert/piscivore	cool	I	8	Percidae
	Channel catfish	<i>Ictalurus punctatus</i>	benthic	invert/piscivore	warm	T	9	Ictaluridae
	Brook trout	<i>Salvelinus fontinalis</i>	hider	invert/piscivore	cold	I	10	Salmonidae
	Lake trout	<i>Salvelinus namaycush</i>	benthic	piscivore	cold	S	11	Salmonidae
	White sturgeon	<i>Acipenser transmontanus</i>	benthic	invert/piscivore	cold	I	12	Acipenseridae
	Green sturgeon	<i>Acipenser medirostrus</i>	benthic	piscivore	cold	S	13	Acipenseridae
	Burbot	<i>Lota lota</i>	benthic	piscivore	cold	I	14	Gadidae
	Mountain whitefish	<i>Prosopium williamsoni</i>	benthic	invertivore	cold	I	15	Salmonidae
	Lake whitefish	<i>Coregonus clupeaformis</i>	water col.	invertivore	cold	I	16	Salmonidae
	Black crappie	<i>Pomoxis nigromaculatus</i>	water col.	invert/piscivore	warm	T	17	Centrarchidae
	Pumpkinseed	<i>Lepomis gibbosus</i>	water col.	invert/piscivore	cool	T	18	Centrarchidae
	White crappie	<i>Pomoxis annularis</i>	water col.	invert/piscivore	warm	T	19	Centrarchidae
	Rock bass	<i>Ambloplites rupestris</i>	water col.	invert/piscivore	warm	I	21	Centrarchidae
	Warmouth	<i>Lepomis gulosus</i>	water col.	invert/piscivore	warm	T	22	Centrarchidae
	Green sunfish	<i>Lepomis cyanellus</i>	water col.	invert/piscivore	warm	T	23	Centrarchidae
	Bluegill	<i>Lepomis macrochirus</i>	water col.	invert/piscivore	warm	T	23.5	Centrarchidae
	Common carp	<i>Cyprinus carpio</i>	benthic	omnivore	warm	T	24	Cyprinidae
	Northern pikeminnow	<i>Ptychocheilus oregonensis</i>	water col.	invert/piscivore	cool	T	25	Cyprinidae
	Peamouth	<i>Mylocheilus caurinus</i>	water col.	invertivore	cool	I	26	Cyprinidae
	Brown bullhead	<i>Ameiurus nebulosus</i>	hider	invert/piscivore	warm	T	27	Ictaluridae
	Yellow bullhead	<i>Ameiurus natalis</i>	hider	invert/piscivore	warm	T	28	Ictaluridae
	Longnose sucker	<i>Catostomus catostomus</i>	benthic	invertivore	cold	I	29	Catostomidae
	Largescale sucker	<i>Catostomus macrochelys</i>	benthic	omnivore	cool	T	30	Catostomidae
	Chiselmouth	<i>Arocheilus alutaceus</i>	benthic	herbivore	cool	I	31	Cyprinidae
	Bridgelip sucker	<i>Catostomus columbianus</i>	benthic	herbivore	cool	T	32	Catostomidae
	Mountain sucker	<i>Catostomus platyrhynchus</i>	benthic	herbivore	cool	I	33	Catostomidae
	Sculpins	<i>Cottus sp.</i>	benthic	invertivore	cool	T	34	Cottidae
	Starry flounder	<i>Platichthys stellatus</i>	benthic	invertivore	cold	S	35	Pleuronectidae

Use order of preference as a guide. Higher trophic level species preferred over lower level. Consider availability of fish, size, historical data available, mix of families/trophic levels per site, angler use.

*Overall pollution tolerance as sensitive (S), tolerant (T), or intermediate (I) - for fish species. Northwest Science 73(2):81-93.